World Journal of Current Medical and Pharmaceutical Research
Content available at www.wjcmpr.com ISSN: 2582-0222

EVALUATION OF PHYSICOCHEMICAL PARAMETERS AND HEAVY METAL CONTENT OF THE SIDDHA FORMULATION VENGARA CHUNNAM

Saranya N, Menaka R
[1]PG Scholar, Department of Pothu Maruthuvam, Government Siddha Medical College, Chennai-106.
[2]Lecturer, Department of Pothu Maruthuvam, Government Siddha Medical College, Chennai-106.

Article History
Received on: 12-06-2025
Revised on: 26-06-2025
Accepted on:08-08-2025

Abstract

Background: Vengara Chunnam is a herbo-mineral Siddha formulation which is commonly used in the management of Urinary disorders such as Anuria, Urolithiasis, Scanty Micturition, Stricture urethra, and albuminuria. So, it is essential to evaluate the safety and purity of the formulation before it is therapeutically used. Aim: The aim of the study is to evaluate the physicochemical parameters and Heavy metal Analysis of the formulation Vengara Chunnam (VC). Methodology: The physicochemical parameters, like Acid-insoluble ash, Total ash, Moisture content, &pH of VengaraChunnam were analysed. Heavy metals were analysed by the Atomic Absorption Spectrometer (AAS) Method. The results were observed and tabulated. The results were tabulated as per PLIM guidelines for standardization of Indian Medicine. Result:The result of sample Vengara Chunnam shows white-colour, fine powdered Chunnam with a very mild odour. The physicochemical parameters of VC show that the total ash value is 87.53%, acid insoluble ash is 8.88%, the moisture content is 0.30% and pH Value is 5.7. Heavy metal analysis of Vengara Chunnam reveals existence of metals like Lead, Cadmium, Arsenic, and Mercury were found in minimal amounts as per WHO guidelines.Conclusion:The study findings show that the sample VC has all properties of Chunnam as per PLIM guidelines.Thus, the study of medicine Vengara Chunnam will be beneficial in treating diseases and supports further research.

Keywords:Heavy Metals, Physico-Chemical parameters, Vengara Chunnam.

***Corresponding Author**
Dr.Saranya N

DOI: https://doi.org/10.37022/wjcmpr.v7i2.360

INTRODUCTION

The Siddha system of Medicine is divided into 2 types, Internal and External medicine. Among 32 categories of internal medicines, Chunnam is a powdered form made of calcined nanoparticles that can remain effective for more than five hundred years [1]. Standardization of a drug confirms its identity, strength, and purity. A lack of quality control can affect the potency and safety of drugs, potentially leading to health issues for consumers [2]. The current study was done to analyze the physicochemical and heavy metal analysis of the drug Vengara Chunnam (PC) which is mentioned in the siddha literature Noigaluku Siddha Parigaram, Part II. It is given for the management and treatment of urolithiasis (Kalladaippu), suppression of urine, scanty micturition, Stricture urethra, albuminuria,edema (Vishasobai), anaemia(pandu), Jaundice (kamalai), kapham and other thodams.It is given with one of the following adjuvants: cow's butter or ghee or honey, or other such diuretics such as tender coconut water, Mullangikilangu juice, Cucumber juice, Vellariviththu rubbed into a solution with water and various other decoctions of Neermulli or Mandurathi ada ikudineer [3]. The main ingredients of the drug were Vengaram(Borax, Sodium biborate) and Latex of Brahma thandu (Argemone mexicana).Borax($Na_2B_4O_7 \cdot 10H_2O$) or Vengaram in Siddha medicine, is a mineral composed of sodium borate decahydrate, typically found in crystalline or powdered forms in boron-rich soils and dry lake beds[4]. In traditional practices, it is not used raw; instead, it undergoes a purification process to eliminate toxic impurities through heating and quenching in herbal liquids like ginger juice or cow's urine. After purification, borax is used in medicines for various conditions, including respiratory disorders (like cough and asthma), digestive issues, skin infections, and some gynecological ailments. Its properties are characterized as pungent (katu), hot in potency (ushnaveerya), and it is known to balance vata and kapha doshas [5]. Argemone Mexicana commonly known as Mexican poppy is a plant with a history of medicinal use in traditional system.Various parts of the plants have been utilized for treating a range of ailments [6]. Due to presence of impurities in the formulation it is necessary to process the formulation for physico chemical and heavy metal analysis before it is therapeutically used.

Aim

To evaluate the physico-chemical properties and heavy metal content of the siddha formulation VengaraChunnam as per AYUSH and WHO guidelines to ensure its safety and quality for preclinical studies.

Methodology

The physicochemical parameters and heavy metal analysis were done in Regional Research Institute of Unani Medicine-RRIUM (NABH Accredited).It was conducted according to the standard test procedures ("Protocol for testing of Ayurvedic, Siddha and Unani medicines. Government of India, Department of AYUSH, Ministry of Health & Family Welfare, Pharmacopeial Laboratory for Indian Medicines").

Drug Authentication

The essential raw materials for the drug were obtained from a reputable raw drug store. The ingredients in the formulation are borax (GSMC/GD/225) and Argemone Mexicana (GSMC/GD/226). Brahma than dulatex was collected from the brahma thandu plant. The drugs were verified by Botanist and Department of Gunapadam, "Government Siddha Medical College, Arumbakkam,Chennai-106".

Sample Preparation

Vengaram, one big mass weighing 10 palams, or in small bits, is taken.It is kept in a jam jar or in a porcelain or a glass jar, and it is coated with brahma thandu paal on 5 consecutive mornings, around one thread thickness all around vengaram. Subsequently, expose it to direct sunlight for approx. 10days/ unless coating is entirely dry and can be peeled off. Subsequently, Vengaram is powdered as well asstored.

Physicochemical Analysis

Itutilizes wide range of analysis methods to know intrinsic molecular/atomic properties. Further Physicochemical investigations of the trial drug have been conducted per PLIM guidelines.

Determination of Total Ash

2g test drug had been computed accurately moreover placed on one "tared silica dish". Test drug had been placed over furnace moreover incinerated at 450˚c unless it attains white color,signifying carbon absence. Sample is allowed to cool & subsequently weighed. Total ash percentage is computed with respect to air-dried drug weight.

Total Ash =Weight of Ash/Weight of crude drug taken × 100

Determination of Acid Insoluble Ash

Ash acquired from total ash test of VC sample had been treated utilizing 25ml dilute HCl acid hence, boiled for 6mins. Afterwards, insoluble material had been gathered in a crucible, cleansed with heated water, and then ignited unless a constant weight was attained. Acid-insoluble ash percentage was found based on air-dried ash weight.

Acid insoluble Ash=Weight of Ash /weight of crude drug taken ×100

Determination of Moisture Content

10 g of test drug VC has been precisely measured and placed in a tared evaporating dish. Experimental drug has been subjected to heating in an oven at 105˚C for 5 hrs. Technique persists until the variance between 2 successive iterations does not exceed 0.25 %. Moisture content percentage in sample has been determined relative to shade-dried drug.

Moisture content=Loss of weight ot the sample per weight of sample ×100

Determination of pH

Five grams of test sample have been dissolved in twenty-five milliliters of distilled water moreover subsequently filtered. Resulting solution is permitted to rest for 30mins before undergoing pH evaluation.[7][8]

Heavy Metal Analysis of Vengara Chunnam

It is done by using AAS (Atomic Absorption Spectrometry). It is widely used method for identifying metalloids moreovermetals in environmental samples. Overall, heavy metal analysis of sample has been conducted by using AAS Model AA 240 Series[9]. This was done to ascertainconcentrations of heavy metals like arsenic, mercury, lead, alongside cadmium in test sample.

Sample Digestion

The test sample has been digested withone mol/L HCl to assess the levels of arsenic and mercury. Likewise, to analyze lead and cadmium, samples have been digested with 1 mol/L of HNO3.

Standard Preparation

The chunnam was made with arsenic (As) and mercury (Hg) at concentration 100 ppm in one mol/L HCl, and cadmium (Cd) and lead (Pb) at concentration 100 ppm in one mol/L HNO3.

Results

Physicochemical parameters of vengarachunnam

Physico-Chemical analysis results indicate total ash value content as 87.53%, Acid-insoluble Ash as 8.88 %, Moisture content as 0.30% and pH of 5.7%.

Table 1: Physico-chemical parameters of Vengara Chunnam

Total ash(%w/w)	87.53%
Acid-insoluble Ash	8.88%
Moisture content	0.30%
pH	5.7%

Heavy Metal Analysis

The results demonstrated that heavy metals Cadmium, Arsenic, lead, as well as mercury, were within permissible limits according to WHO limits.

Table 2: Results for heavy metal analysis.

Heavy/Toxic metals	Result	WHO permissible limit(ppm)
Lead	0.0107mg/L	10
Cadmium	0.0016mg/L	0.3
Arsenic	2.4306mg/L	3
Mercury	0.7878mg/L	1

Discussion

The study sample Vengara Chunnam shows the characteristics of white colored, soft-touch, free-flowing, solid-state powder with very mild odour and very fine in nature.The fineness of Chunnam denotes easy absorption along with better availability of the drug. Total ash value of drug Vengara Chunnam was 87.53% which shows purity and quality of drug.Acid insoluble ash value of Vengara chunnam was 8.88%, indicating that trial drugs are free from contamination by siliceous materials such as sand or dust. Moisture content of the drug, determined through a process called loss on drying(LOD), was 0.90%. As per Ayurveda pharmacopoeia of India,LOD is preferably one or below one.As moisture content of drug is minimal,it ensures the stability of the drug and prevention of microbial growth. The pH value of Vengara Chunnam was 5.7%, indicating its acidic character. Drug's acidic properties facilitate fast absorption in stomach on oral administration. According to heavy metal analysis, the amount of lead,cadmium, Mercury present in the drug Vengara Chunnam was 0.0107mg/L, 0.0016mg/L, 2.4306mg/L,0.7878/L respectively.These values represent that the medicine is safe with trace amounts of heavy metals, which are within their permissible limit. This ensures the safety as well as quality standard of the drug.

Conclusion

Based on the findings, it is concluded that Vengara Chunnam is a nano-medicine that offers advantages such as better absorption and bioavailability. It is preferably non-toxic to humansat therapeutic dosages. Hence, this drug can be applied to further clinical studies.

Funding

Self -funded

Acknowledgement

This publication is a part of the MD program of Government Siddha Medical College, Arumbakkam, Chennai-106 affiliated with The Tamil Nadu Dr.MGR Medical University,Chennai.

Conflict of Interest

Authors have declared that no competing Interests exist.

Informed Consent and Ethical Statement

Not applicable

Author Contribution

Dr.N.Saranya, conducted the study and prepared the manuscript and Dr.R.Menaka guided the study and approved the manuscript.

Reference

1. R. Thiagarajan B.I.M. GunapadamThathu Jeeva Vaguppu 4th Edition 2004; Published By Indian Medicine and Homeopathy Dept. Chennai 106; p. 265
2. Senthil Kumar C. Physicochemical Evaluation and Toxicological Studies of Herbomineral Preparation, International Journal of Pharmaceutical and Chemical Sciences, Volume (1) Jan-Mar; 2012.
3. Shanmugavel H.B.I.M.Noigalukku Siddha Parigaram Part-2.1993; Department of Indian medicine and Homeopathy, Chennai-106.
4. Nadkarni, K. M. (2002). Indian Materia Medica (Vol. 1). Bombay: Popular Prakashan. Palanichamy, S., & Nagarajan, S. (2011). Siddha Medicine – An Overview. Ancient Science of Life, 30(4), 116–120.
5. Thomas C.Fuller (1986).Poisonous plants of California.University of California press.pp.201
6. Protocol for Testing of Ayurvedic,Siddha and Unani medicines[Internet].Ghaziabad:
7. Department of AYUSH, Pharmacopeial Laboratory for Indian Medicines;2008.P.49.
8. Kamphuis GM, van Hattum JW, de Bie P, Somani BK. Method of alkalization and monitoring of urinary pH for prevention of recurrent uric acid urolithiasis: a systematic review. Translational andrology and urology. 2019 Sep;8(Suppl 4):S448.
9. Saper RB Kales SN Paquin J Etal. Heavy metal content of Ayurvedic herbal medicine products, JAMA, p. 2868 - 2873,(2004).
10. Arul Priya S, Sudha V. Phytochemical and PhysicoChemical analysis of Siddha herbo-mineral Preparation KalladaippuChooranam. J Res Bio Med Sci [Internet]. 2020May13 [cited 2024Jul.30];3(2):43-7.
11. Savjani KT, Gajjar AK, Savjani JK. Drug Solubility: Importance and Enhancement Techniques. ISRN Pharmaceutics. 2012;2012:195727:2.